The Need of R
Valley Develop

DEPARTMENT OF PLANNING AND DEV

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Conservation Branch
HONOURABLE DANA PORTER, Minister

THE NEED OF RIVER VALLEY DEVELOPMENT IN ONTARIO

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THE rivers of Ontario have played a large part in her history; they were often the main travelled ways; they are the sources of water; they have provided power; they have afforded recreation of various kinds; they have served as sewers; more recently they have often produced damaging floods, especially in spring; and many of them have in summer become reduced in flow, or fail altogether.

We are well aware in a general way of the central importance f water in our lives; but it is not, I think, generally appreciated what mense amounts of water actually must be available to keep a country- de in full productivity. Some figures will suggest this. Crop plants quire 300 to 500 pounds of water to produce one pound of dry crop; production of one pound of beef is said to require some 40,000 nds of water; and it has been estimated that to produce the flesh l taken by one adult in a year requires about 8 million pounds of er—a considerable part of the total precipitation at current figures. s does not, of course, mean that this water is removed bodily and nanently, but that it has to be available to circulate through the ely complex chemical processes that go to make crops and stock. his we must add the very considerable amounts we need for domestic industrial uses.

The fertility of our soil depends on water; any soil can become a rt if the water is removed, and there are ancient and recent examples is very occurrence.

Ontario was a well-watered land when white man began to develop n two areas that have been recently investigated from this point iew there are about one and a third miles of watercourse to each are mile of land. In the early days many, perhaps most, of these ams contained fish; they provided swimming holes; and they gave er for mills; now after a hundred or more years of development picture has changed in many important respects.

For some time there has been a growing realization, created by a ety of experiences, that the water situation of Ontario is now unsatis- ory. The swimming hole might no longer be deep enough, or indeed ht dry up; there might no longer be desirable fish, where once good t was to be found; the mill might have to work short hours through

insufficiency of water; a stream might show unpleasantly obvious evidence of heavy pollution; or springs and wells might fail which used to give abundant supplies.

There was, however, little exact information till the survey by K. M. Mayall of King Township in 1937. Among many interesting things he found that in 100 years—the span of agricultural development in the township—seven eighths of the 200 miles of its once permanent streams had become intermittent, failing in summer; and 17% of the wells failed, while others were reduced in flow.

Very similar figures were found to hold for the 1500 miles of water course in the Peel Plain and adjacent highlands.

	Streams			Uncleared land	
	Miles permanent	Miles temporary	Total	per cent temporary	Brush swamp etc., per cent
Upland	321	199	520	38	23.3
Lowland	178	837	1015	82	10.5
Total	499	1036	1535	Mean..67%	Mean.15.4%

The map of this plain does not reveal the whole story, for it shows all permanent streams as the same size, which they are not. It is to be noted that those streams in the plain which are permanent do not rise in the plain; they owe their permanence to their origin in the less fully developed uplands; the plain, now very highly developed agriculturally, is no longer a nursery for useful rivers and streams.

The two accompanying pictures illustrate this point; they show the Etobicoke Creek near Summerville in spring and in summer at a point where some 60 years ago there was a mill. A hundred and fifty years ago the Etobicoke was, according to a land surveyor of the time, "a rapid stream of water."

Further east the upper waters of the Wilmot Creek have shortened; they start further downhill than they used to, leaving dead dry valleys above the present sources. The surveys on the Ganaraska, Thames, and Humber Rivers reveal similar alarming conditions and it is around the headwaters of these and neighbouring streams that erosion and land misuse is a major problem.

In Grey County, further north, it has been reported that now 75% of the streams no longer flow from ground springs, and that there is a seasonal water shortage all over the county.

All across the province the story is the same, varying only in details; from Maitland Creek, now sadly reduced from its former beauty, to the Grand River, now so incapable of maintaining sufficient flow to ensure the removal of filth that expensive treatment became necessary, past the Credit River, once a salmon river, but now lacking

Sketch map to show watercourses of the region west of Toronto, including Peel Plain and neighbouring areas. The broad sinuous dotted line marks approximately the limits of the Plain, on the west the escarpment of the limestone uplands, on the north the hills of the Interlobate Moraine. The lower land east and south of this boundary is more fully developed agriculturally than the land north and west of it. The streams shown by full lines flow all the year; those shown by broken lines are intermittent. Black spots are lakes.

breeding places, for they are silted over—the list could be extended to the eastern end of the Province—larger and lesser waters alike are in a decline.

Not only do the rivers fail; they often flood. The two things are indeed the opposite sides of the same bad penny; heads—drought, tails—flood, and in either case we, the inhabitants of the country lose. The water which is the floods of the spring thaw is a considerable part of what should be the summer's supply, going damagingly fast over the surface of the land to the nearest lake in a few wasteful days, instead of percolating steadily into the ground to replenish the vast underground reservoir, which is, among other things, the stabilizer of the streams, and which is the most important mass of water in the country.

The present state of streams and rivers is a symptom of much wider damage to the natural economy of the countryside. Practically all flood water is thick with sediment; it would probably cause us surprise if it were not, but it is in an unsound condition. It has been said by a member of the Soil Conservation Service of the U.S.A., that: "agricultural country with dirty streams is, must be, temporary; agricultural country with clean streams is, must be, permanent." A hard saying, but one that is worth our close attention.

There are none too many figures of the amount of sediment thus carried down by the rivers to be deposited where it is of no further use to man on the bottom of our lakes. In a high flood on the West Humber River, some 2,000 tons an hour were going past. It is to be noted that while some of this sediment is carved from the banks of the river, some—the amount varies with local conditions—is the fertile top layer of land under cultivation.

Surveys are being made in the Province to show the actual amounts of topsoil thus lost to farmers by uncontrolled—and in some cases actually encouraged—rapid movement of water over cultivated land. A land use survey of a typical watershed in Southern Ontario shows that twenty-four per cent of the area had lost one third to two thirds of its topsoil.

There is another type of soil loss associated with the unbalance of our water—that due to wind action, and in some localities it is probably greater than the loss through the action of water; it can only occur on dry soils, and is most marked on light.

Although the problem of soil erosion will not be dealt with here, it is noted with emphasis that present soil losses whether by gullying, by rilling, by sheet erosion, or by wind—these are important reasons for river development and control.

Photograph by A. F. Coventry

Much of the rapid run-off which contributes to flood conditions in Southern Ontario rivers comes from severely eroded land at the headwaters—clay gullies in Peel County.

Along with failing rivers we have failing wells. City folk are not perhaps so conscious of this as country-dwellers; if water comes from a tap practically unfailingly at demand and with no labour, it is easy to lose sight of the enormously complex natural water balance that must exist behind the immensely specialized work of waterworks engineers, and to forget that the city, no less than the country, depends on a healthy state of natural water supplies.

If the water comes direct from a well, whether it be pumped by power or by hand, any deficiency of supply is brought home immediately and if total failure imposes the chore of hauling water, its lack becomes a serious inroad on the elementary amenities of life, as altogether too many country dwellers have discovered in recent years.

We have almost no accurate information on this aspect of our water owing to our failure to collect systematic data.

It is clear then that the natural water system of southern Ontario has undergone a profound and deleterious change during the period of development of the land by white man.

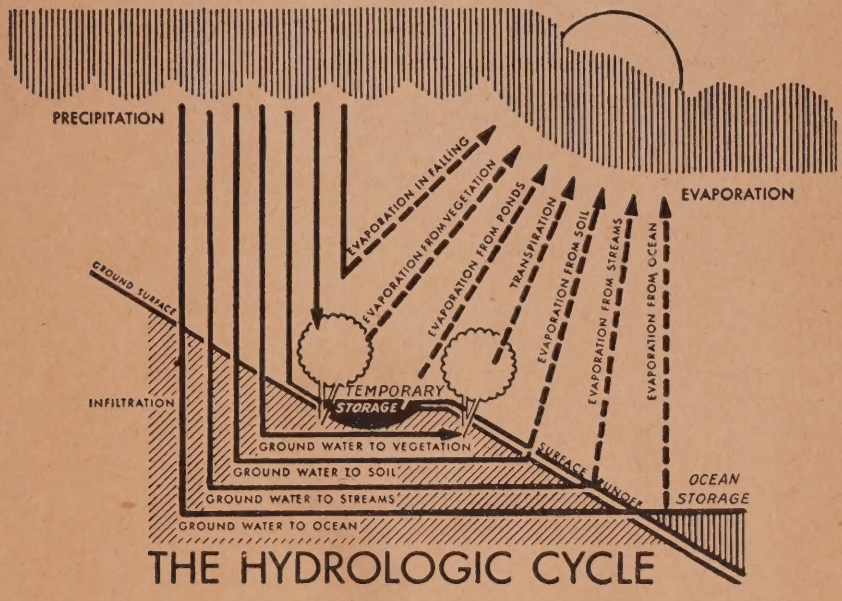
We have drought in summer and floods in spring, and sometimes at other seasons; we have too much water when we do not especially

want it, and not enough water when it would be most useful; and this unbalance is not only bad in itself, it is the cause of great expense to communities which are subject to floods, and of much loss of labour for those who have to carry water, often for months on end. At the same time this water unbalance is causing us the loss of unmeasured amounts of fertile soil, which is one of the ultimate assets on which the prosperity of the country depends.

We may add too that this ill-health of the waters is reflected in our wildlife, both game and otherwise. Anglers, a considerable number of people from youth to age, year by year have more difficulty in discovering fish, and this in spite of persistent planting. All across the Province the story is the same; old maps show salmon rivers and elder members of the community recall trout streams where now are polluted and shrunken and overheated trickles, or no streams at all.

And since the state of the land is so closely bound up with the state of the rivers, land game is less available than in earlier days; the habitats are no longer as extensive as formerly; and since a proper proportion of game habitats is an essential feature of a healthy countryside, quite apart from the game, the present situation cuts two ways—it indicates an unhealthy land and at the same time the pleasures of living in the country are reduced.

The same general argument applies to such fur animals as used to be available in southern Ontario.



THE HYDROLOGIC CYCLE

Photograph by A. R. A. Taylor

There is another type of soil loss associated with the unbalance of our water—that due to wind action and in some localities it is probably greater than the loss through the action of water. The Interlobate Moraine in Durham County, Ontario.

The proper treatment of wildlife and its relation to other aspects of the life of the community is an important consideration in river valley management.

If, then, we are to cope with the process which is going on we must look for the cause.

It is to be found in the *Hydrologic cycle.* This familiar diagram shows—in a simplified fashion—what can happen to water as it comes to the earth's surface and leaves it again in its constant circulation. It may follow many paths, some useful to man, some indifferent, some actually injurious. The amounts following the various paths will differ according to the nature of the country. In aboriginal Ontario they were determined by the forests which covered most of the land, so that there was little or no bare surface. Under the trees was a litter, a mat of twigs and leaves; the soil was penetrated by roots living or dead; and the movement of the trees by the wind kept open cracks deep into the earth; and frost did not bite so deep as into exposed land.

Under these conditions water on the surface, whether from melting snow or from falling rain, could not run off fast, it was held to satura-

tion point by the litter on the surface and could find, even in spring, many entrances into the deeper layers of the soil; it therefore arrived in abundance at the great underground reservoir, which could thus maintain the springs and streams of our early well-watered condition.

There could be no erosion, no soil loss, because the whole surface of the land was protected.

Now, it was of course entirely necessary that some of this land should be cleared for agricultural use; it was entirely natural that the abundant trees should be used for lumber and firewood; but the process of clearing was carried out so energetically in all its forms that it brought into existence the evils with which we are faced today. I do not know that we can greatly blame our forbears for the heavy burden they have bequeathed us; they hardly had the knowledge to be able to foresee the outcome of their stripping of the land of cover and of the use of agricultural methods not well adapted to the land and climate. It must, however, be admitted that more than a hundred years ago a New England farmer pointed out the inevitable decay of the countryside if the then-used practices were continued. They were continued.

In Southern Ontario we have removed too high an acreage of trees. Assessment figures for 1943 indicate that 30 of the 42 counties in Southern Ontario have less than ten percent of their area in woodland. Twenty-five per cent of the area in woodland is considered the necessary minimum.

The rest of the land has been exposed for cultivation, and as we have seen, the relation of such land to the water balance is very different from that of the original set-up.

We have not been willing even to leave marshes as reservoirs; we seem to have had a, perhaps unspoken, slogan: "if you find a marsh, drain it"; and the result has not always been happy.

Marshes are often a most important factor in maintaining a healthy water balance; this is especially true of those at relatively high altitudes. The most famous of these is—or was—Luther Swamp, a sort of gigantic sponge 1,500 feet above sea level, in which, accumulated to saturation, meltwater from snow and rain was fed evenly down streams in all directions. It is now seamed with ditches which ensure the rapid removal — as floods — of these waters to the consequent detriment of rivers which take their birth in it. The dam near Fergus is one result of the draining of Luther Swamp.

I am told that still more draining of high-level swamps, also contributory to the Grand River, is in progress, a process that can only accentuate the troubles we already have.

Photograph by A. F. Coventry.

We have floods in spring and droughts in summer and too much water when we do not especially want it, and not enough water when it would be most useful; and this unbalance is not only bad in itself, it is the cause of great expense to communities which are subject to floods, and of much loss of labour for those who have to carry water often for months on end.—The Etobicoke River near Summerville in flood.

This is merely an example of a general tendency, and it is a thing which must be most carefully considered in preparing river development policy.

To sum up: practically every phase of the development of southern Ontario has contributed to destroy the natural balance of water. We have removed too many trees, even from lands unfit for agriculture; we have taken no significant steps to replace trees on large areas which by their nature can grow no other crop (some 8,000 square miles in all); we have cultivated the land in such ways as to encourage the loss of essential soils and water; and we have failed to realize the value of swamps and ponds.

The fact that we share these sins of omission and commission with many other countries does not make our present burden any lighter, nor diminish our responsibility for doing all we can to remedy the situation. It cannot improve itself; it will on the contrary get progressively worse. To land already waste will be added year by year more

waste, the rate will vary with local conditions, but as an example in one county some two square miles, about 1,300 acres, slip out of productivity each year and become incapable of further cultivation.

We all know of the disaster of the Prairie Provinces, and are apt to look on it as a special and terribly severe case; it has, however, been estimated by a competent authority that, bitter as was the suffering in the west, there has been east of Winnipeg, as the result of the degradation of our natural resources, just as much suffering and waste of human effort as there has been west of that city. The full toll is not so obvious, because it is not so concentrated, but it is there and Ontario has its share.

We are "half living in a half-living land," as a recent author puts it; our decreasing rural population shows it, and comparison with say Denmark—of course before the war—confirms it. It is perhaps worth noting here the frequent statements that we are to have a much increased population by immigration; the estimates vary widely, from 8 million to 25 million for Ontario (2 to 6 times the present population); but it is probably true, however unpalatable, "that a sufficiently large population to make Canada fully prosperous could not now be maintained upon our present resources unless an entirely new policy is adopted towards them."

The Etobicoke River near Summerville in summer.

Photograph by A. F. Coventry.

Not only do the rivers fail; they often flood—Port Hope, 1937.

I have stated the case for river valley development; it is either development or degeneration.

The cheerful side of the matter is that, given the will, a very great deal can be done to restore not former conditions—for we do not want to re-forest all southern Ontario—but a balanced and healthy countryside better able to maintain a good human population than at present. The methods are known and have been applied very successfully elsewhere; they can be applied here if we get a clear understanding of what is to be done, and do it.

What river valley development means is the restoration and preservation of all the natural resources of the river valley, for they are all inseparable parts of a total balance, and cannot profitably be managed piecemeal.

River valley development begins before the water reaches even the ditches; it begins by encouraging water to soak into the land instead of being hurried off as fast as possible to the nearest ditch; that is the time to control waters, before they have gained momentum and while they are on the land where they can play their proper part in the maintenance of the essential water balance.

This of course raises some problems of drainage, of the need of getting water off some kinds of land so that they may be available for cultivation at an early enough date. The need cannot be denied, but it does not follow that the only way to get water off a piece of land is to conduct it as fast as possible to the nearest river. It may be led by very gentle gradients to gently graded and properly protected ditches and in many cases it could be stored in ponds on low areas of land, where it would have a chance to percolate into the soil, and where it would be, at least for part of the season, a water supply. It has been shown, moreover, that if such ponds can be made permanent they will raise important quantities of edible fish.

In some parts of France water culture is regularly alternated with field culture as part of the normal management of farms, the location of the ponds being altered every few years, with the old ponds coming under productive cultivation as they are drained.

These procedures hold up water on its way to the streams and tend to make its influx more gradual and so more manageable; it is in the little streams—after the surface itself—that floods are best controlled.

Here in the little streams before they come together to make the larger river, more ponds can be created by the generous use of small dams wherever the configuration of the countryside allows; these will again be useful as stock-watering ponds, and in some cases will replace a lost swimming hole, and perhaps become the central feature of a park, to the improvement of the amenities of a community. They will hold back some of the always over-abundant water supply of the season of thaw and allow still more water to get underground.

With these control measures about the headwaters, control of the main river becomes much easier, and to them will of course be added other methods of control, such as reforestation of suitable areas, special crops, development of pastures, and many minor procedures.

This view of river valley development obviously puts the task largely on the individual; and indeed he is by all odds the most important factor; unless the inhabitants of the valley take their personal shares in the business the job can never be properly done. It is a co-operative undertaking, going forward according to a plan for the whole valley, a master-plan to ensure that all the separate things that

are done shall fit into a harmonious whole working with nature and not against nature as most of our so-called development has hitherto done.

Planning has been a good deal misunderstood and the idea has aroused antagonisms which are not justified. We know that natural resources are inter-related and form a complex balanced system, and that the disturbance of one element affects the others: we have seen what unplanned exploitation has made of our natural resources, notably of water; and it is clear that if we are to restore them we must do so in an orderly fashion, i.e. we must plan.

It is impossible to run a factory without planning. If the activities of one department were not co-ordinated with those of all the others, confusion would soon put an end to the business: much more is planning needed to ensure that our natural resources, now badly out of gear, are brought into working relations with each other again, for they are far more complex than any business, even the biggest.

It has been objected that planning interferes with the liberty of the individual, in which we properly take pride as an essential part of our way of life; but even in our way of life there must be some restrictions and some commands, they are inseparable from membership in a community. Under any plan there must be some giving as well as taking, and whether the compulsions of a plan voluntarily agreed on for the general good of the community are preferable to the harsh compulsions of run-down land or the inexorable penalties of outraged natural laws may be a matter of opinion; but that is the choice.

Planning can, I think, be worked out within a fully democratic framework. I do not say it is simple or easy, but neither is the problem. Progress depends on an ever-widening public appreciation of the need of conservation, so that in time a considerable proportion of the population will come to the conclusion that "something must be done about it." If the conviction is strong enough to go beyond talk, it is the starting point of action.

Those interested will agree to co-operate for the common benefit, realizing that public interests must be given a generous place alongside private rights; that there must be yielding of privilege here and there, that the condition of the community as a whole shall be bettered, with, naturally, a consequent improvement in the life of the individuals composing it.

There is no compulsion save that of conviction; those who do not like the scheme can stay outside.

Such planning then develops from the region upwards: local conviction of need inspires local decision to act, and the steps of action might be somewhat as follows:—

(1) The formation of public opinion that local conditions would bear improvement;

(2) Widespread recognition in the district that it is possible to bring about improvement by co-operation, if enough of those who live in the district are willing to take part in planned management of land under their control;

(3) The setting up of a Conservation Authority under the provision of the Conservation Authorities Act whereby each municipality within the watershed is represented. The Authority may request the Province to help in the planning by providing the necessary technical advice and surveys on all phases of river valley development, including soil, woodland, water and wildlife. This will produce a master plan which shall serve as a guiding principal for action;

(4) Implementing the plan. The Conservation Authorities Act also provides for Provincial Grants to an Authority to carry out an approved scheme.

A programme of this kind is easy to talk about, but in realizing it many troublesome problems may arise, and to solve them will call for the fullest understanding of the meaning of river valley development and a large measure of goodwill among the participants in the

Marshes are often a most important factor in maintaining a healthy water balance.

undertaking. For example:—the control of work done on private land at public expense; doubts as to the reasonableness of asking folk at the mouth of a river liable to flood to bear part of the expense of, say, planting protective trees on someone else's land miles upstream; questions of the right of a landowner to build dams across a stream which traverses his land on its way to many another man's land; or the right of an owner to cut clean his woodlot, even if its removal will imperil the permanence of a stream and perhaps the livelihood of people downstream (I have in mind a case where this actually happened).

River management is not a matter for urban centres alone, nor for the rural parts alone: each has its special and proper claims on what the river has to offer, and those claims must be reconciled by discussion and agreement to the greatest general benefit. If purely sectional interests prevail, the odds are long against permanent restoration and conservation.

If development is to be effective, the unit of development will have to be the whole river basin, and this will often extend over several administrative areas as at present set up: again mutual understanding and co-operation will be essential, for nature takes no account of the straight lines which the T-squares of early engineers imposed on our country.

If we are to develop our rivers so that once again they play their proper part in the life of the modern communities in their valleys we shall have to bring into action all the knowledge we have or can obtain on all our natural resources, for unless all are carried along together something less than the best results in development will be achieved.

This is a big job, but fortunately for us in Ontario few of the river basins we are concerned with are really big; their areas are in hundreds rather than thousands of square miles, but taken together they comprise the whole countryside. Each is a project worthy of the best attention of its inhabitants, and in each the method of going about the job is the same—co-operation all along the line.

This is in brief the case for river valley development in southern Ontario. Success will only be reached if some long established ideas are modified and some old practices abandoned; but we are in an age of changing ideas and new methods and there is this to be said—river valley development is not a mere theory, an empty dream; it has been abundantly shown over and over again that it is a dream that can be made to come true in a few years; that it can be done by democratic methods; and that the value of democratic life is enhanced as the countryside progresses towards renewed well-being.